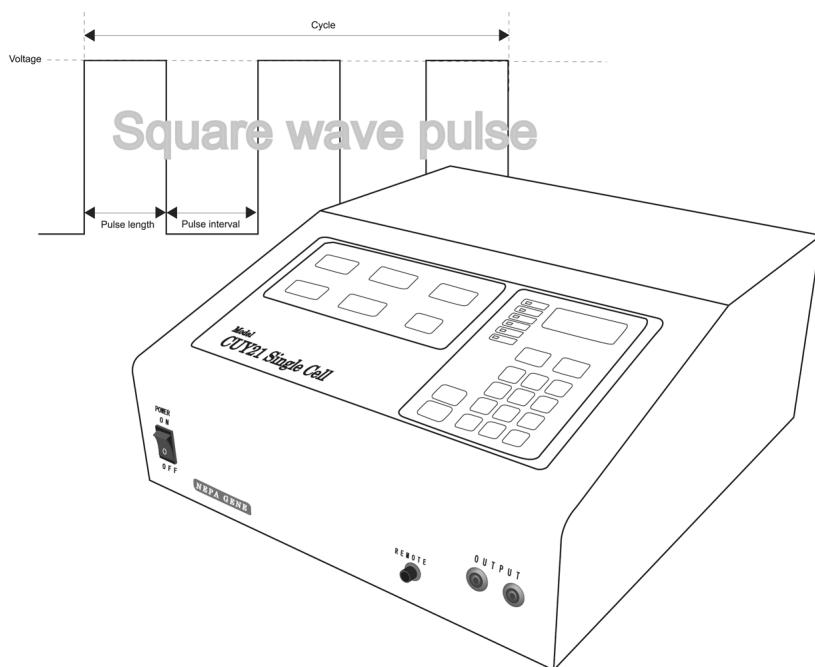


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# **Square wave pulse electroporator**

## **CUY21SC**

### **User manual**



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## 1. Warranty

### Limited warranty for products

Nepa Gene Co. Ltd., warrants that its products, as delivered, shall conform to its specification and be free of defects in materials and workmanship when used in accordance with their intended use. This warranty is limited to twenty-four (24) months from the product's original date of shipment from Nepa Gene Co.,Ltd.. The warranty for non-durable products is limited to thirty (30) days from the product's original date of shipment from Nepa Gene Co.,Ltd.. Further, this warranty dose not apply to modifications made to the products by customer, or damage to products resulting from modifications or repairs effected by customer or other personnel not authorized by Nepa Gene Co.,Ltd. to perform such work. This warranty shall not apply to damage resulting from (I) loss or damage in transit, (II) unreasonable use, (III) customer's negligence, or (IV) accident. Nepa Gene Co.,Ltd. reserve the right to examine the alleged defective goods to determine whether the warranty is applicable.

### Limited warranty and disclaimer

Nepa Gene Co.,Ltd. warrants that all services supplied hereunder will be performed in a workmanlike manner, except for the express warranties provided to customer under the above "limited warranty for products", Nepa Gene Co.,Ltd. makes no other warranties or conditions, expressed or implied, as to the services or parts supplied hereunder, and Nepa Gene Co.,Ltd. expressly disclaims all warranties or conditions of merchant-ability or fitness for a particular use.

### Limitation of liability

Nepa Gene Co.,Ltd. liability under this agreement is limited to the expense of providing product repair, neither Nepa Gene Co.,Ltd. nor its employees or agents shall be liable for indirect, special, incidental, or consequential damages, including without limitation, business interruption, lost profits or revenues, wages or injury to persons or property, customer and Nepa Gene Co.,Ltd. agree that the sole and exclusive remedy for nonconforming goods shall be replacement of defective goods or, at Nepa Gene's option, refund of the purchase price to customer. The parties acknowledge that the price of Nepa Gene Co.,Ltd.'s products would be much greater if Nepa Gene Co.,Ltd. undertook more extensive liability.

Any action by customer for any alleged breach of the warranty stated in this section must be brought within 90 calendar days after the end of the warranty period.

#### **Notice:**

Products returned to Nepa Gene Co.,Ltd. for repair or replacement shall be received prepaid.

If found not to be defective under the terms of warranty a charge will be made for repair or replacement and freight costs will be at customer's expense.

Specifications are subject to change without notice. For this reason and at its sole discretion, Nepa Gene Co.,Ltd. reserves the right to upgrade products during a repair process. Prices for out of warranty repairs are subject to change without notice.

User name :

Invoice date :

Description

Model :

Serial number :

## 2. Specification

<b>DC pulse</b>	
Waveform	Square
Voltage	0.1-99.9V in 0.1V resolution
Pulse length	0.05-99.9ms in 0.01ms resolution
Pulse interval	0.1-999ms in 0.1ms
No of pulses	1-99

### Miscellaneous

Impedance measurement	Up to 39.9KΩ
Voltage measurement	0.1-99.9V
Current measurement	0.001-1.60A When current < 1.00A, 1mA resolution. When current ≥ 1.00A, 10mA resolution.
Safety limit	1.60A (See 6. Safety function)
Memory	Up to 99 programs

Power	115 or 220V 2.5A 50/60Hz
Fuse	5A
Dimensions	W360mm x L380mm x H180mm
Weight	12.3Kg

### 3. Introduction

Thank you very much for purchasing CUY21SC square wave pulse electroporator. Before using this product, please read this Instruction Manual thoroughly so that you can use this product at its full functionality. After reading, retain this manual in an easily accessible location so that you can refer to this manual whenever you have a problem or trouble during use.

#### 3.1 Unpacking

Remove all packing materials and components from a carton.

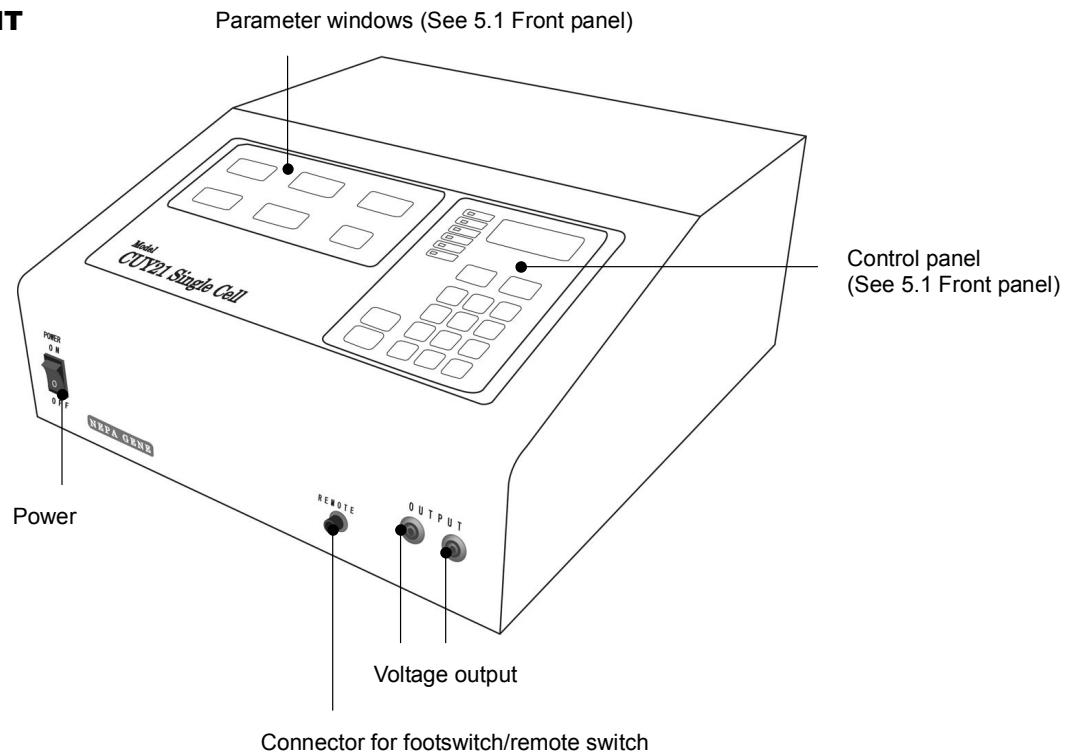
CUY21SC should arrive complete with the following components:

- 1 x Main unit
- 1 x Footswitch cat No. C200
- 1 x Connector cables (red and black) cat No. C115CB
- 1 x Hook cables (red and black) cat No. C117
- 1 x Power cord
- 1 x Dust cover
- 1 x Operation manual

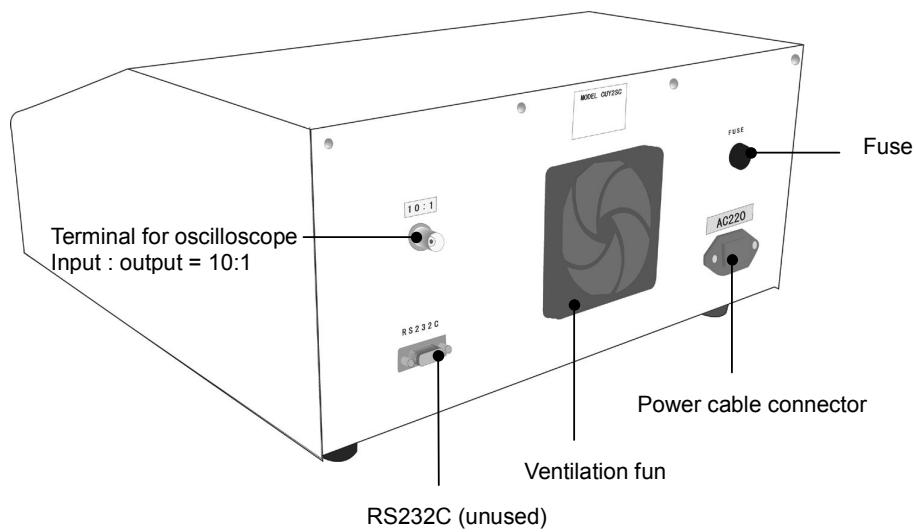
If any item of the above list is not included, contact the local supplier nearby.

### 3.2 Components and part names

#### FRONT



#### REAR



## 4. Precautions

The following symbols are used in this user manual in order to make use of the instrument and prevent the instrument from being damaged.

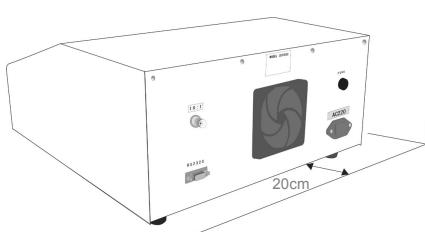
Follow the instructions marked with the symbol.

 <b>CAUTION</b>	Failure to follow the guidelines marked with this symbol could result in minor personal injury or product and /or peripheral damage
 <b>WARNING</b>	Failure to follow the guidelines marked with this symbol could result in severe personal injury or death

 <b>WARNING</b>	Do not bend the power cable forcibly, or place heavy object on the cable because it might damage the cable and cause fire or electric shock. If the power cable is damaged, discontinue use and replace it immediately.
	Do not open the cover of the device when the power is present. Only qualified personnel should perform service procedure.
	Keep the inflammable materials away from the device.
	Do not touch the uninsulated parts of cables and electrodes when power is on.
 <b>CAUTION</b>	Do not drop or hit the device
	Do not drop any metallic objects or liquids on to the device
	Be sure to hold the connector part of the power cable when disconnecting the cable. Pulling on the cable portion may cause it to fray and break
	Do not operate the device in any of the following cases:
	<ul style="list-style-type: none"> <li>- There is physical damage to the device</li> <li>- Smoke, strange noise or smells erupt from the device.</li> </ul>
	Contact the nearby supplier immediately.
	Disconnect power cable from the device if the device is not used
	Use proper fuse specified for this product.

## 4.1 Installation

1. Place CUY21SC on a level, dry and clean surface near an appropriate electrical outlet and

<b>! CAUTION</b>	<p>Do not install CUY21SC in areas that are: 1. damp, humid or very dusty 2. exposed to direct sunlight 3. poorly ventilated 4. subject to extreme temperature or humidity changes, e.g., near an air conditioner or heater.</p> <p>Be sure to allow the required space behind the instrument for proper ventilation.</p> 
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2. Check that the voltage indicated on the rear panel of the unit meets the local power requirements.

<b>! CAUTION</b>	Use the proper power cable specified for the device.
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3. Connect the power cord to the receptacle on the rear panel of the unit and plug the unit into the appropriate electrical outlet.

<b>! CAUTION</b>	Make certain the outlet is properly grounded before operation.
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4. Connect the foot switch C200 to the connector on the front of the unit (Refer to Fig. 1)

<b>! WARNING</b>	Ensure that the main power of the device is turned off.
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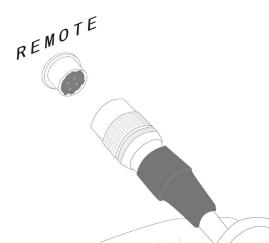


Fig.1 BNC connector of Footswitch

5. Attach the connector cables C115CB to the output connector on the front of the device (Refer to Fig. 2)

Note. We recommend that the cable should be connected to the output connector whose color is matched with that of the cable.

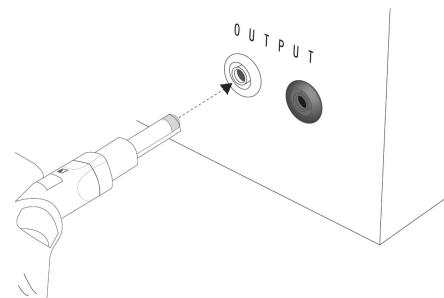


Fig. 2 C115CB male connector

If an electrode without cables such as petridish and needle electrodes is used, please go to step 6. Otherwise please go to step 8.

6. Connect the male connector of a hook cable C117 to the connector cables C115CB (Refer to Fig. 3).
7. Hook up a hook of a hook cable C117 to the electrode (Refer to Fig. 4)
8. Connect the electrodes such as tweezers electrode to the connector cable C115CB (Refer to Fig. 5)

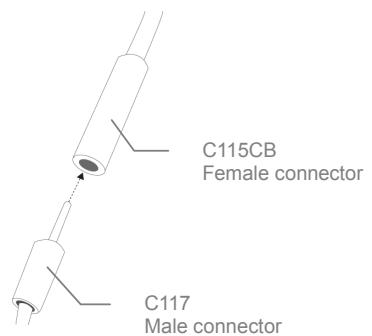


Fig. 3 C115CB and C117

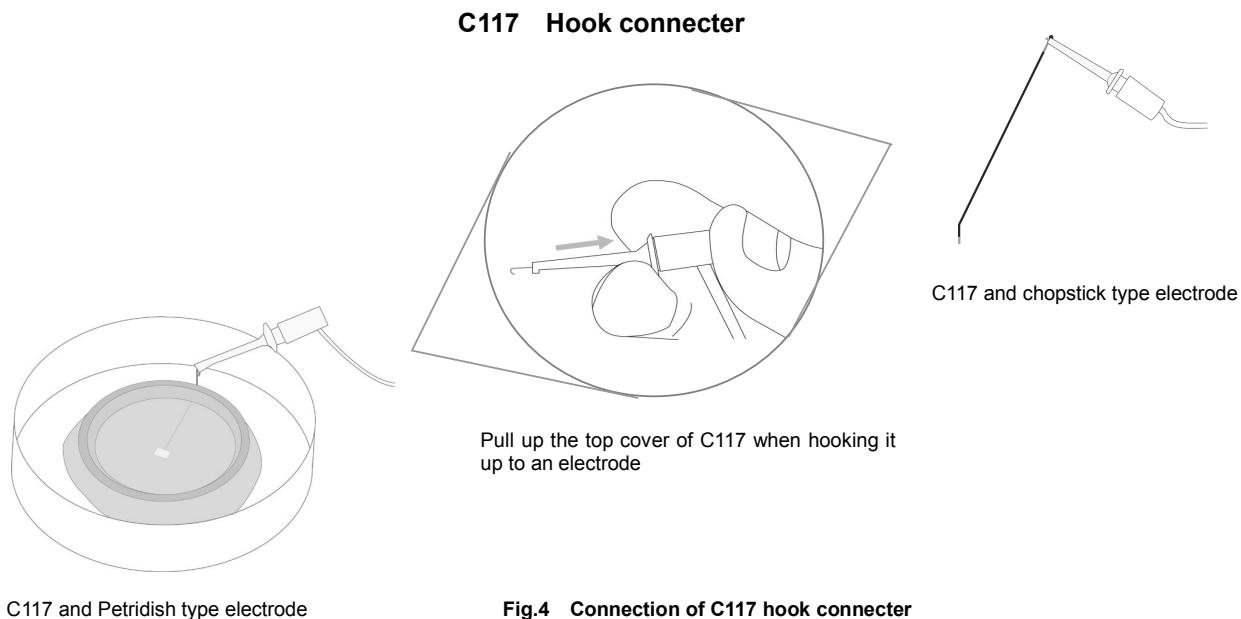


Fig.4 Connection of C117 hook connector

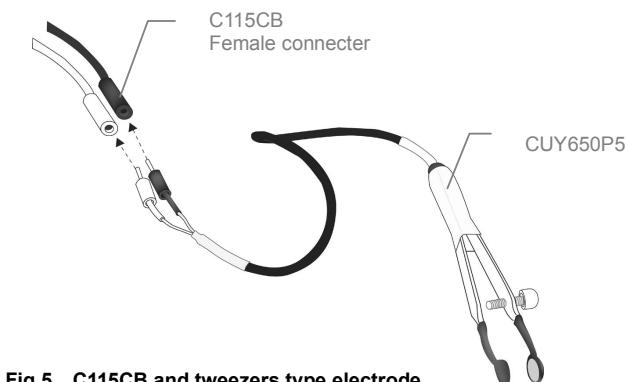
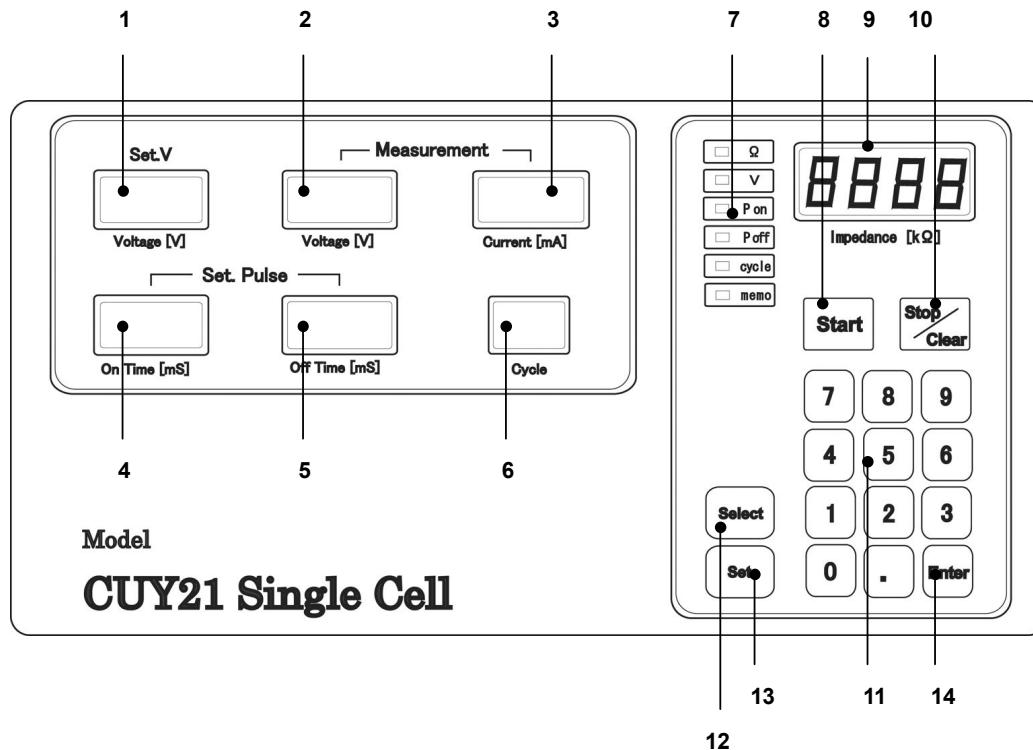


Fig.5 C115CB and tweezers type electrode

## 5. Getting Started

### 5.1 Front Panel



#### Parameter windows

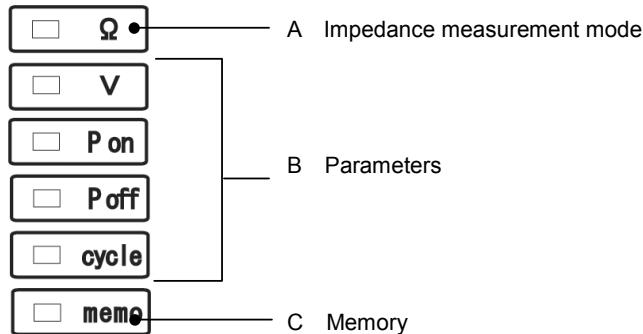
Name	Description
1. Set V	Display the programmed voltage in 0.1V resolution
2. Measurement voltage	Display the actual voltage in 0.1V resolution  If the problem occurs during the measurement, the measurement voltage will be displayed as a sign (---).
3. Measurement current	Display the actual current in 1mA resolution when current < 1.00A or in 10mA resolution when current $\geq 1.00A$  If the problem occurs during the measurement, the measurement current will be displayed as a sign (---).

4. On Time	Display the programmed pulse length of each square wave pulse in 0.01ms resolution.  When the entered value is more than 10.00ms, only the first decimal place is displayed on “On Time” parameter window. ie) If pulse length is set to 50.25ms, it is displayed as 50.2ms on the parameter window.
5. Off Time	Display the programmed pulse interval between square wave pulses in 0.1ms resolution  When the entered value is more than 100.0ms, the integer number is displayed on “Off Time” parameter window. ie) If pulse interval is set to 100.1ms, it is displayed as 100ms on the parameter window.
6. Cycle	Display the programmed number of square wave pulses up to 99 cycles.

**Control panel**

Name	Description
7. Indicators	Indicate the mode or parameter to be edited. See 5.2 Indicator
8. Start	Execute the impedance measurement or program.
9. Main display	Display the measured impedance value, current value of selected parameter or program number
10. Stop/Clear	Delete the entered value and cancel the edit
11. Numerical key	Enter the numerical value
12. Select	Select the impedance measurement mode or parameter to be modified
13. Set	Enable the edit of the parameters. When [Set] button is pressed, the selected parameter can be edited.
14. Enter	Save the entered value and execute the recall of the program

## 5.2 Indicator



Indicator	Description	
A Impedance measurement mode	$\Omega$	Impedance of sample and buffer can be measured prior to electroporation.
B Parameters	$V$	Applied voltage can be entered and edited in the range from 0.1V to 99.9V in 0.1V resolution. When this indicator is selected, the current value of this parameter is displayed on the main display.
	$P_{on}$	Pulse length can be entered and edited in the range from 0.05ms to 99.9ms in 0.01ms resolution. When this indicator is selected, the current value of this parameter is displayed on the main display.
	$P_{off}$	Pulse interval can be entered and edited in the range from 0.1ms to 999ms in 0.1ms resolution. When this indicator is selected, the current value of this parameter is displayed on the main display.
	Cycle	No. of pulses can be entered and edited from 1 up to 99 cycles.
C Memory	Memo	The specific number of the program can be selected and recalled. Program number is displayed on the main display. i.e.) Ch. 5

## 5.3 Operation

### 5.3.1 Create new program

1. Turn the power on
2. Select “memo” by pressing [Select]button. LED light beside memo will be turned on.
3. Press [Set]button once. LED light beside memo will blink and main display will be blank.
4. Enter the program number by using the numerical keypad where the new program will be saved.
5. Press [Enter]button once. The short beep will sound twice.
6. Select “V” by [Select]button.
7. Press [Set]button once. LED light beside “V” will blink and main display will be blank.  
Note. If you would like to cancel the programming, press [Stop/Clear]button once.
8. Enter the applied voltage by using the numerical keypad.  
Note. If you would like to cancel the entered value, press [Stop/Clear]button once
9. Press [Enter]button once. When the value is saved, the short beep sounds twice.  
Note. If the long beep sounds once, the entered value is out of range and will not be saved.
10. Select “Pon” by [Select]button.
11. Repeat step 6-8
12. Select “Poff” by [Select]button.
13. Repeat step 6-8
14. Select “cycle” by [Select]button.
15. Repeat step 6-8

### 5.3.2 Impedance measurement

1. Turn the power on.
2. Press [Select]button until the LED light beside  $\Omega$  is turned on.
3. Press [Start]button once. Impedance measurement will begin and value will be displayed on the main display

Note. If the impedance is beyond the range,  $39.9K\Omega$ , make sure that the cables are properly connected.

### 5.3.3 Recall / Electroporation

1. Select “memo” by [Select]button
2. Enter the program number to be recalled.
3. Press [Enter]button once. The short beep will sound twice. Programmed parameters will be displayed on parameter windows.
4. Press [Start]button.
5. Electroporation program will be executed. The short beep sounds twice and the word “End” is displayed on the main display after the program is completed.

Note. Make sure that the indicators other than impedance measurement mode should be selected. If the impedance measurement mode is selected, the impedance measurement will be executed.

 <b>WARNING</b>	Do not touch the uninsulated connections and components of an electrode and cable when power is present.
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6. The actual current and voltage will be displayed on parameter windows respectively.

### 5.3.4 Edit the program

1. Turn the power on
2. Select “memo” by pressing [Select]button. LED light beside memo will be turned on.
3. Press [Set]button once. LED light beside memo will blink and main display will be blank.
4. Enter the program number to be edited by using the numerical keypad
5. Press [Enter]button once. The short beep will sound twice.
6. Select the parameter to be edited by [Select]button.
7. Press [Set]button once. LED light for the selected parameter will blink and main display will be blank.

Note. If you would like to cancel the programming, press [Stop/Clear]button once.

8. Enter the desired value by using the numerical keypad.

Note. If you would like to cancel the entered value, press [Stop/Clear]button once

9. Press [Enter]button once. When the value is approved and saved, the short beep sounds twice.

Note. If the long beep sounds once, the entered value is out of range and will not be saved. Enter the appropriate value again.

10. Repeat step 6-9 if other parameters should be edited.

## 6. Safety function

For safety operation, CUY21SC offers the safety limit function which protects one from electrical accident during the experiment. As CUY21SC is designed for in-vivo electroporation, one must grab and manipulate electrodes by hand, so there is high risk of electrical accident during the experiment. To avoid such an unfortunate accident, safety function is built in CUY21SC. When current exceeds the specified limit (1.60A), the device shuts off DC pulses immediately and automatically.

## 7. Contact

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